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# Investigating the Processes that Control Lower Stratospheric Ozone: A 2-D Model Study

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In re-analyzing total ozone data from the TOMS satellite for the period 1978–1990 (Stolarski et al., 1991) found unexpectedly high ozone reductions at midlatitudes of both hemispheres, for example a decadal average change of 5% at 50˚N. Current multi-dimensional models of the global atmosphere do not represent this trend using homogeneous chemistry. Additional chemical reactions have been proposed to occur on sulfate aerosol (e.g., Hofmann and Solomon, 1989). Reactions that convert $N_2O_5$, $ClONO_2$, and $BrONO_2$ on sulfate aerosol to less reactive forms have been observed in the laboratory. In this study, we will use our improved dynamical representation of the LLNL 2-D chemical-radiative-transport model of the global atmosphere (following the approach of Garcia et al., 1992; Garcia and Solomon, 1994) to investigate the chemical partitioning in the lower stratosphere when heterogeneous reactions on sulfate aerosols are included. Detailed comparison between observed and model-derived distributions will be shown. Implications for family partitioning of modified transport between tropical and midlatitudes will be investigated. In addition, special attention will be focused on the implications of additional homogeneous reactions that include the iodine chemical family (IOy = I+IO+HI+HONO2; Solomon, 1994) on their potential importance in lower stratosphere odd-oxygen balance.

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